Lab: Practicing with Spring Scales

You and your partner will practice using the spring scales to measure force.

In this activity you will be asked to draw a Free Body Diagram. This includes a square to represent the object to which the force is being applied, arrows indicating each force and the magnitude (size) of the forces, the net force which includes the magnitude and direction of the resulting motion. You must use abbreviations to indicate the types of forces acting on the object.

Key for Forces

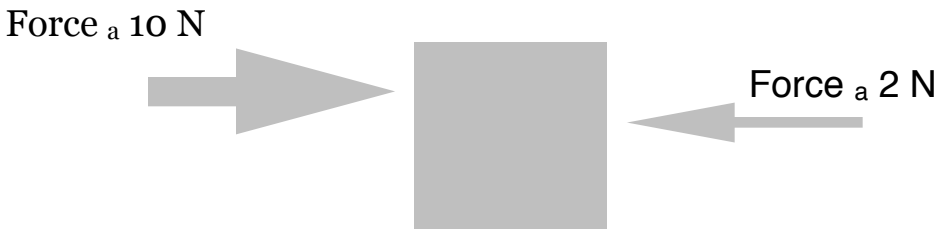
Gravity F_g

Applied F_a

Normal F_n

Friction F_f

Net F_{Net}



Remember to do the following things:

☒ Zero your spring scale each time you find the force of an object.

☒ To use the spring scale, tie a string around the object you are measuring, and then make a loop at the end of the string. Hang the loop on the hook at the end of the spring scale.

☒ NEVER hang any objects on the spring scale directly if possible.

You have a few objects at your table. With a partner, use the spring scale to measure the force needed to lift and to pull the object a distance of 1 meter. Record the force in Newtons and then try to convert from Newtons to grams in the table below. Draw a diagram of the measurement you made to express the forces as either balanced or unbalanced.

Part 1: Data Collection

Remember: 1 Newton = 100 grams.

Object	Force needed to lift object (in Newtons)	Force needed to lift object (in Grams)	Force needed to pull object (in Newtons)	Force needed to pull object (in Grams)
Weight				
Rock				
Glass bottle				

Part 2: Free Body Diagrams

Weight: Pull Lift

Rock: Pull Lift

Glass bottle: Pull Lift

Analyze & Conclude:

1. Which object required the most force to lift? Prove it using your data!

_____

_____

2. Which object required the least force to lift? Prove it using your data!

_____

_____

3. If there were no numbers on the spring scale, how could you tell which objects had more or less force?

_____

_____

4. What force is acting against the objects as you lifted them?

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5. Does the force from question 4 affect the objects if you were to pull them across the top of your lab table? Why or why not? What force(s) are acting on the PULLED objects?

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6. How do the free body diagrams help you observe balance/unbalanced forces compared to the spring scale?

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